

Preliminary Amendment

Applicant: Claus Dworski et al.

Serial No.: Unknown

(Priority Application No. 103 32 008.3)

(International Application No. PCT/DE2004/001148)

Filed: Herewith

(Priority Date 14 July 2003)

(International Filing Date 04 June 2004)

Docket No. I431.144.101/FIN 503 PCT/US

Title: ELECTRICAL CIRCUIT AND METHOD FOR TESTING ELECTRONIC COMPONENT

IN THE CLAIMS

Please cancel claims 1-32 without prejudice.

Please add new claims 33-64 as follows:

1.-32. (Cancelled).

33. (New) An electrical test circuit for testing integrated circuits, particularly dynamic A/D converters, the electrical test circuit comprising:

a first input configured for receiving a test signal of an integrated circuit;

a second input, configured for receiving a control signal;

a third input configured to receive a normalized reference signal, particularly one that is formed to be synchronous with the test signal;

a control device configured such that the deviation or the amplitude or the phase of the reference signal or of the test signal is or, respectively, are changed;

a measuring device configured to generate a difference signal by subtracting the reference signal from the test signal; and

an output for outputting the difference signal.

34. (New) The electrical test circuit according to claim 33, comprises wherein the measuring device is configured to generate that at least one quality parameter from the difference signal, the output being intended for outputting the difference signal or the quality parameter.

35. (New) The electrical test circuit according to claim 34, comprising wherein the quality parameters are the standard deviation of the test signal or the deviation of the test signal or the amplitude of the test signal.

Preliminary Amendment

Applicant: Claus Dworski et al.

Serial No.: Unknown

(Priority Application No. 103 32 008.3)

(International Application No. PCT/DE2004/001148)

Filed: Herewith

(Priority Date 14 July 2003)

(International Filing Date 04 June 2004)

Docket No. I431.144.101/FIN 503 PCT/US

Title: ELECTRICAL CIRCUIT AND METHOD FOR TESTING ELECTRONIC COMPONENT

36. (New) The electrical test circuit according to claim 33, comprising wherein the test signal, the reference signal, the difference signal and the quality parameter or parameters are present in digital form.

37. (New) The electrical test circuit according to claim 33, comprising wherein from the difference signal or from the quality parameter, the ratio between the signal and the noise component of the test signal or the ratio between the signal and the noise or distortion component of the test signal or the total unadjusted error of the test signal or the total adjusted error is calculated.

38. (New) The electrical test circuit of claim 33, comprising wherein the control device comprises a control loop circuit which is provided for adapting the deviation of the test signal, the control loop circuit being configured in such a manner that a deviation-corrected test signal is generated in that the difference values between the deviation of the test signal and of the reference signal is added together and in that the test signal is corrected by addition with this aggregate difference value.

39. (New) The electrical test circuit according to one of claim 33, comprising wherein the control device comprises an amplitude correction circuit for matching the amplitude of the reference signal to the amplitude of the test signal, the amplitude correction circuit being configured in such a manner that an amplitude-corrected reference signal is generated in that the absolute value of the deviation-corrected test signal is determined and added together by the amplitude correction circuit and in that the reference signal is corrected with the aggregate absolute value of the deviation-corrected test signal.

40. (New) The electrical test circuit according to claim 33, comprising wherein the control device comprises a phase displacement circuit, the phase displacement circuit being

Preliminary Amendment

Applicant: Claus Dworski et al.

Serial No.: Unknown

(Priority Application No. 103 32 008.3)

(International Application No. PCT/DE2004/001148)

Filed: Herewith

(Priority Date 14 July 2003)

(International Filing Date 04 June 2004)

Docket No. I431.144.101/FIN 503 PCT/US

Title: ELECTRICAL CIRCUIT AND METHOD FOR TESTING ELECTRONIC COMPONENT

configured in such a manner that the phase of the reference signal is matched to the phase of the test signal.

41. (New) The electrical test circuit according to claim 40, comprising wherein the phase displacement circuit comprises a shift register, a decoder, at least one bus driver and at least one D-type flip flop.

42. (New) The electrical test circuit according to claim 40, comprising wherein the phase of the reference signal is displaced up to one half signal period by the phase displacement circuit.

43. (New) The electrical test circuit according to claim 33, comprising wherein the squares of the amounts of the difference values between the deviation-corrected test signal and the amplitude- and phase-corrected reference signal is added together by the measuring device or the minimum and maximum values of the difference values between the deviation-corrected test signal and the amplitude- and phase-corrected reference signal is stored by the measuring device.

44. (New) The electrical test circuit according to claim 43, comprising wherein the electrical test circuit is configured in such a manner that the standard deviation is calculated by the measuring device from the square of the amounts of the difference values between the deviation-corrected test signal and the amplitude- and phase-corrected reference signal or from the minimum value of the difference values between the deviation-corrected test signal and the amplitude- and phase-corrected reference signal or from the maximum value of the difference values between the deviation-corrected test signal and the amplitude- and phase-corrected reference signal.

Preliminary Amendment

Applicant: Claus Dworski et al.

Serial No.: Unknown

(Priority Application No. 103 32 008.3)

(International Application No. PCT/DE2004/001148)

Filed: Herewith

(Priority Date 14 July 2003)

(International Filing Date 04 June 2004)

Docket No. I431.144.101/FIN 503 PCT/US

Title: ELECTRICAL CIRCUIT AND METHOD FOR TESTING ELECTRONIC COMPONENT

45. (New) The electrical test circuit according to claim 43, comprising wherein the electrical test circuit is configured in such a manner that the phase of the reference signal is adjusted in accordance with the minimum of the standard deviation by the phase displacement circuit.

46. (New) An electrical phase displacement circuit for correcting the phase of a reference signal with respect to a test signal of an integrated circuit, the electrical phase displacement circuit comprising:

a first input, for receiving a reference signal from a tester;

a second input for receiving a clock pulse signal from a tester;

at least one bus driver which is coupled to at least one D-type flip flop;

the D-type flip flop or flip flops are provided for displacing the phase of the reference signal;

a shift register and a selection element coupled to the shift register, particularly a decoder, which is formed in such a manner that in each case one bus driver is activated in dependence on the data stored in the shift register,

a first output connected to the bus drivers, which is intended for sending out the phase-displaced reference signal; and

a second output which is intended for sending out a control signal.

47. (New) An electrical circuit for the tolerance tube test of integrated circuits, particularly of dynamic A/D converters, the electrical circuit comprising:

an electrical test circuit as claimed in claim 33 and an electrical phase displacement circuit as claimed in claim 45, the first output of the electrical phase displacement circuit being connected to the third input of the electrical test circuit and the second output of the electrical phase displacement circuit being connected to the second input of the electrical test circuit.

Preliminary Amendment

Applicant: Claus Dworski et al.

Serial No.: Unknown

(Priority Application No. 103 32 008.3)

(International Application No. PCT/DE2004/001148)

Filed: Herewith

(Priority Date 14 July 2003)

(International Filing Date 04 June 2004)

Docket No. I431.144.101/FIN 503 PCT/US

Title: ELECTRICAL CIRCUIT AND METHOD FOR TESTING ELECTRONIC COMPONENT

48. (New) An integrated circuit comprising an electrical test circuit according claim 33 and with an electrical phase displacement circuit of claim 45.

49. (New) A probe card for testing integrated circuits, the probe card comprising an electrical test circuit according to claim 33 and an electrical phase displacement circuit of claim 46.

50. (New) A load board for receiving a probe card for testing integrated circuits or with one or more test sockets for testing integrated circuits or for connecting a handler to a tester of integrated circuits, the load board comprising:

an electrical test circuit according to claim 33 and an electrical phase displacement circuit according to claim 46.

51. (New) A tester with measuring sensors, particularly for currents and voltages, and with instruments for generating digital signals or data streams, the tester comprising:

one electrical test circuit according to claim 33 and an electrical phase displacement circuit of claim 46.

52. (New) The tester according to claim 51, comprising wherein a low-pass filter is provided which is configured in such a manner that the digital signal received by the low-pass filter or, respectively, the digital data stream received by the low-pass filter is converted into an analog signal.

53. (New) A tester with measuring sensors, particularly for currents and voltages, and with instruments for generating analog signals, the tester comprising:

an electrical test circuit according to claim 33 and an electrical phase displacement circuit according to claim 46.

Preliminary Amendment

Applicant: Claus Dworski et al.

Serial No.: Unknown

(Priority Application No. 103 32 008.3)

(International Application No. PCT/DE2004/001148)

Filed: Herewith

(Priority Date 14 July 2003)

(International Filing Date 04 June 2004)

Docket No. I431.144.101/FIN 503 PCT/US

Title: ELECTRICAL CIRCUIT AND METHOD FOR TESTING ELECTRONIC COMPONENT

54. (New) A method for testing an integrated circuit, comprising:
equipping a tester with an integrated circuit;
applying current and voltage values to the integrated circuit by the tester;
generating a reference signal by means of the tester, which corresponds to the ideal output signal of the integrated circuit;
displacing the phase of the reference signal in such a manner that the reference signal and the test signal of the integrated circuit vary essentially synchronously;
matching the amplitude of the reference signal to the amplitude of the test signal;
matching the deviation of the test signal to the reference signal;
forming a difference signal by subtracting the reference signal from the test signal; and
evaluating the difference signal.
55. (New) The method as claimed in claim 54, comprising wherein at least part of the method is performed with an electrical test circuit according to claim 33 and with an electrical phase displacement circuit according to claim 46.
56. (New) The method according to claim 54, comprising wherein the electrical test circuit or the tester forms a quality value, particularly the standard deviation of the test signal or the deviation of the test signal or the amplitude of the test signal.
57. (New) The method according to claim 54, comprising wherein the electrical test circuit or the tester determine the ratio between the signal and the noise component (SNR) or the ratio between the signal and the noise or distortion component (SNDR) or the total unadjusted error (TUE) or the total adjusted error (TAE).
58. (New) The method according to claim 54, comprising wherein analog current and voltage values are applied to the integrated circuit by the tester.

Preliminary Amendment

Applicant: Claus Dworski et al.

Serial No.: Unknown

(Priority Application No. 103 32 008.3)

(International Application No. PCT/DE2004/001148)

Filed: Herewith

(Priority Date 14 July 2003)

(International Filing Date 04 June 2004)

Docket No. I431.144.101/FIN 503 PCT/US

Title: ELECTRICAL CIRCUIT AND METHOD FOR TESTING ELECTRONIC COMPONENT

59. (New) The method according to claim 58, comprising wherein the tester additionally comprises a conversion unit, particularly a low-pass filter, which, converts a digital data stream generated by the tester into analog current and voltage values and applies these to the integrated circuit.

60. (New) A computer program for executing a method for testing an electronic component, which is configured in such a manner that the method is executed according to claim 54.

61. (New) The computer program as claimed in claim 60, comprising wherein it is contained on a storage medium, particularly in a computer memory or in a random access memory.

62. (New) The computer program as claimed in claim 60 which is transmitted on an electrical carrier signal.

63. (New) A data medium with a computer program as claimed in claim 60.

64. (New) A method in which a computer program as claimed in claim 60 is downloaded from an electronic data network such as, for example, from the Internet to a computer connected to the data network.